

the most violent winds occurred after the storm-centre had passed the coast-line.

IV.—Developed in the Ohio valley on the afternoon of the 6th, as a secondary depression, the barometer being lowest in Colorado. It passed to the northeastward over the lower lake region and northern New England, causing rain and snow in the northern states east of the Mississippi, and general rains in the southern states during the 6th and the morning of the 7th. It disappeared to the northeast of New England, where the barometer was unusually low on the afternoon of the 7th.

V.—This was a slight depression which advanced from the region near Lake Winnipeg on the 10th, following a southeasterly course over the north portions of the lake region, and crossing the Saint Lawrence river near Montreal on the 11th. Light snows occurred in the northern districts, but the disturbance developed only slight energy until it had reached the Atlantic in the vicinity of Halifax, Nova Scotia, when the wind shifted to northwesterly on the New England coast with increasing force. The following maximum wind-velocities were reported: Barnegat City, New Jersey, 52 miles, nw.; Hatteras and Kittyhawk, North Carolina, 44, ne.; Sandy Hook, New Jersey, 43, nw.; Block Island, Rhode Island, 46, n. After passing east of the coast, this storm apparently moved in a northeast direction, following the general course of north Atlantic storms.

VI.—Developed in western Kansas during the night of the 13th, while an extensive depression was present on the Pacific coast. It became well defined during the 14th, and moved in a northeasterly direction over Missouri, Iowa, and the upper lake region, causing light rain in all districts south of the lake region, and snow in New England and at the northern stations as far west as the Missouri valley on the 15th. It disappeared when near lake Huron, probably joining the low area which followed immediately to the west.

VII.—This is the only storm occurring during the month which has been traced from the Pacific coast eastward across the Rocky mountains to the Atlantic. General rains prevailed on the Pacific coast during the 13th and 14th, while this disturbance was advancing from the Pacific to the coast of Oregon. The easterly movement was apparently retarded until the centre of disturbance had passed to the east of the coast, when the velocity increased rapidly, causing the storm-centre to pass from Oregon to Colorado in twenty-four hours. The afternoon reports of the 15th placed the centre of this disturbance in eastern Colorado, the most southerly point of the storm's track. The course changed to the northeast, and during the night of the 15th, and on the following day, the weather was decidedly stormy in the lake region and northwest. The cold wave which followed the storm caused a rapid increase of the barometric gradient in the west quadrants of the storm, and the sudden changes of temperature which occurred are indicated by the north and south directions of the the isothermal lines in the Mississippi valley on the 16th. After passing over the upper lake region the storm followed the general course of the Saint Lawrence valley, and disappeared to the east. It was most severe while passing from the upper Mississippi valley over the upper lake region.

VIII.—Apparently developed in Minnesota during the night of the 19th. It moved eastward over Lake Superior to the upper Saint Lawrence valley on the 20th, increasing in energy and becoming more contracted. This disturbance, however, did not effect the weather in the United States, generally, but light snow occurred in the northern portions of the middle and New England states and at stations in the lake region as the storm-centre passed over these districts. After crossing the Saint Lawrence river, the storm-track inclined to the north of east, and the barometer fell rapidly after the centre passed east of the coast-line.

IX.—This disturbance was observed in southern Texas on the morning of the 23d, although the reports of the 22d showed that a storm was slowly developing in that region. Heavy rains occurred in the southern states during the 23d as the

storm passed northeastward over Texas, and in the Ohio valley and upper Mississippi and lower Missouri valleys on the 24th. The morning reports of the 24th showed the centre of disturbance to be in southern Missouri, and on the following morning it had passed over Lakes Michigan and Huron. It increased greatly in energy during the 24th, causing heavy rains and high winds in the south and middle Atlantic states and lake region, and snow and sleet in the northwest, where cold, freezing weather quickly followed. This was probably the most severe storm of the month, and the floods in the lower Mississippi were greatly increased by the heavy rains which fell during the 23d and 24th. After passing the lake region, the barometer fell to 29.30 near the centre of disturbance, and violent gales occurred at stations northeast of New England. The gales continued until the 27th, accompanied by very cold weather. This storm was last located on the night of the 25th north of Gaspe or Father Point.

X.—This was a slight disturbance which passed eastward north of the lake region on the last day of the month. It was first observed north of Duluth, Minnesota, on the morning of the 27th, and moved in a southeasterly course over New England to the Atlantic, when its course became easterly, and it disappeared without causing any marked change of weather in the United States. Light snow fell in New England during the morning of the 28th, but the weather cleared in that region during the day, and the month closed with unusually clear weather in all districts.

NORTH ATLANTIC STORMS DURING FEBRUARY, 1883.

[Pressure expressed in inches and in millimeters; wind-force by scale of 0—10.]

Chart ii. exhibits the tracks of the principal storms that have occurred over the north Atlantic ocean during February, 1883. The location of the various storm-centres has been approximately determined from reports of observations furnished by agents and captains of ocean steamships and sailing vessels in the north Atlantic, and from other miscellaneous data received at this office up to March 21st. The observations used are, in general, simultaneous, being taken each day at 7 h. 0 m. a. m., Washington, or 0 h. 8 m. Greenwich mean time.

Ten depressions have been traced across the Atlantic; these have moved with more or less rapidity in the usual northeasterly track, but, owing probably to the prevalence of high barometric readings over western Europe, the storm-centres appear to have passed northeastward at some distance from the coasts of the British Isles, but generally sufficiently near to affect the meteorological conditions over those islands. From the 1st to the 15th of February, the weather in the north Atlantic was characterized by a succession of violent and dangerous gales; the depressions numbered iii., iv., v., and vi., caused unusually heavy gales, especially number vi., which exhibited the violence of a tropical hurricane. After the 20th, an area of high pressures apparently spread over the ocean, and the depressions charted after that date appear to have been shallow, and did not develop any unusual energy; the winds diminished in force and generally cloudy weather prevailed till the end of the month.

The following descriptions relate to the storms traced on the chart:—

I.—This was probably a continuation of the storm traced as number xi., of the January chart. On January 31st, the depression was apparently central near N. 47°, W. 37°; it moved eastward and on the 1st, the centre was near N. 48°, W. 20°. Captain Wilson, of the s. s. "Salerno," in N. 49°, W. 22°, reported: January 31st, at 8 p. m., barometer began to fall very rapidly; wind backing to sw. and s. and blowing a heavy gale; at midnight it fell calm with very heavy sea running. On February 1st, at 4 a. m. (in about N. 49° 10', W. 21° 40'), the wind came suddenly from the eastward and continued to blow a furious gale, gradually hauling to ne., n. and nw., the sea blowing over the ship in a continuous sheet of water. As the wind shifted, the barometer began to rise and the wind and sea moderated. On the 2d, the depression was central south of Ireland, and in connection therewith, very strong gales,

with rain, occurred over the Bay of Biscay and the English Channel.

II.—This disturbance was central over the Gulf of Saint Lawrence on the morning of the 1st. It passed eastward over Newfoundland, and on the 2d, it was shown near N. 50°, W. 43°; on that date, the s. s. "Lake Huron," in N. 45° 53', W. 42° 45', reporting barometer 29.56 (750.8), being a fall of .53 inch in twenty-four hours; wind w., force 8. The depression moved east-northeastward, and on the 3d, was central near N. 52°, W. 29°, the s. s. "State of Florida," in N. 52° 19', W. 21° 58', reporting barometer 29.39 (746.5), wind ssw., force 8, overcast, ten hours heavy rain. The barometer rose very slowly after the passage of the storm-centre, and vessels between the thirtieth and fortieth meridians reported generally low barometer, with snow and sleet. During the 3d, the depression moved somewhat slowly northeastward, with gradually decreasing pressure, and on the 4th, the centre was near N. 52°, W. 32°. The s. s. "Lord Clive," in N. 51° 25', W. 25° 20', reported: at 0. 8m., Greenwich mean time, barometer 29.24 (742.7), wind nw., force 4; at 9.32 p. m., the barometer read 29.15 (740.4), which was the minimum reading, wind light and unsteady. After midnight, the barometer began to rise, and a high sea from the s. and ssw. was experienced, with passing showers of rain. Captain Scott, of the s. s. "Plantyn," reported: noon, (ship's time,) in N. 49° 43', W. 13° 51', barometer 29.15 (740.4) and falling steadily, wind s. by w., fresh gale; at 7 p. m., wind sse., with squalls of hurricane force, very high sea running, in which the vessel sustained damage to boats; at 11 p. m., the barometer began to rise and the weather improved. On the 5th, the disturbance was central as an extensive depression west of Ireland, causing heavy southerly and southwesterly gales and rain over the western part of that island.

III.—This is probably a continuation of the storm traced as low-area ii., of chart i., for February. On the 4th, the depression was central in the Canadian Maritime Provinces whence it moved into the Atlantic, causing moderate gales along the coast. The disturbance moved in an east-northeasterly direction, attended by rapidly diminishing pressure at the centre. On the 5th, the storm-centre was near N. 46°, W. 43°; the s. s. "State of Indiana," in N. 46° 24', W. 44° 16', reporting barometer 28.94 (735.1), wind ne., force 4, weather squally and changeable. Strong westerly and northwesterly gales occurred south and west of the centre, while to the eastward, the winds were of moderate force. The s. s. "Adriatic," in N. 45° 35', W. 42° 56', reported west wind of force 9, while the s. s. "Waesland," in N. 47° 12', W. 42° 43', had an easterly wind of force 4, with snow. By the 6th, the disturbance having moved rapidly northeastward was shown near N. 50°, W. 21°. Captain Scott, of the s. s. "Plantyn," reported as follows: "6th, 2 a. m. (ship's time), wind se., sea beginning to increase, barometer 28.60 (726.4), and falling rapidly; at 7 a. m. it was blowing a hard se. gale. with squalls of hurricane force and very high sea; at 9 a. m., the barometer read 27.90 (708.6), still falling; at 10.23 a. m., there was a calm for twenty minutes, and a water-spout was observed on the port-quarter; at this time, the barometer read 27.88 (708.4); at 11.5 a. m., 27.85 (707.4); at 11.25 a. m., 27.80 (706.1); during the last four hours the winds varied between s. and ssw. At noon, the ship's position was N. 50° 46', W. 21° 52', barometer 27.80 (706.1), strong gale; at 0.18 p. m., the wind veered to wsw. and w., blowing hard and increasing in force; 0.40 p. m., wind wnw.; 1 p. m., wind nw.; 1.10 p. m., barometer 27.69 (703.3), stationary, wind increasing in violence. At 1.40 p. m., the barometer read 27.74 (704.6); 4 p. m., 27.89 (708.4); 8 p. m., 28.20 (716.3); midnight, 28.50 (723.9); 4 a. m. of the 7th, 28.55 (725.2), wind of hurricane force. The gale was at its height between 5 and 8 p. m.; at 11 p. m., the wind began to decrease, and at midnight, it had moderated to a strong gale." (Note: the barometric values above given are as read off, the barometer is believed to read .46 inch too low.)

The following vessel-reports indicate that the values reported

by the s. s. "Plantyn," are nearly correct, and leave no doubt as to the unusual depth of this depression:—

S. S. "Silesia," between N. 40° 56', W. 19° 10', and N. 50° 53', W. 23° 00'.

Date.	Time.	Barometer.		Wind.	Force.	Weather.
	(Greenwich.)	Inch.	Mill.			
February 6.....	5.10 a. m.	29.36	745.7	sse.	8	
6.....	9.10 a. m.	29.02	737.1	sse.	8	
6.....	11.10 a. m.	28.71	729.2	sse.	8	
6.....	12.10 p. m.	28.59	726.2	sse.	8	
6.....	1.10 p. m.	28.39	721.1	s.	8	
6.....	2.10 p. m.	28.31	719.1	s.	8	
6.....	3.10 p. m.	28.27	718.0	s.	8	
6.....	4.10 p. m.	28.22	716.8	s.	8	
6.....	5.10 p. m.	28.26	717.8	s. by w.	8-9	
6.....	6.10 p. m.	28.39	721.1	s. by w.	8-9	
6.....	7.10 p. m.	28.52	724.4	s. by w.	8-9	
6.....	8.10 p. m.	28.56	725.4	s. by w.	8-9	
6.....	9.10 p. m.	28.66	728.0	w. by s.	8-9	
6.....	10.10 p. m.	28.81	731.8	w. by s.	8-9	
6.....	11.10 p. m.	29.04	737.6	w. by s.	8-9	
7.....	12.10 a. m.	28.92	734.8	w. by s.	8-9	
7.....	1.10 a. m.	28.92	734.8	w. by s.	10	
7.....	2.10 a. m.	28.96	735.6	w. by s.	10	
7.....	3.10 a. m.	29.09	738.9	w. by s.	10	
7.....	4.10 a. m.	29.09	738.9	w. by s.	10	
7.....	5.10 a. m.	29.11	739.4	w.	8	
7.....	6.10 a. m.	29.11	739.4	w.	8	
7.....	7.10 a. m.	29.11	739.4	w.	8	
7.....	8.10 a. m.	29.11	739.4	w.	8	
7.....	9.10 a. m.	29.11	739.4	w. by n.	6	
7.....	10.10 a. m.	29.08	738.6	w. by n.	6	
7.....	11.10 a. m.	29.08	738.6	w. by n.	6	

Captain McKay, of the s. s. "Pavonia," reported: 6th, at noon, Greenwich time, wind se. by s., force 5, barometer 28.14 (714.7), and falling; heavy confused and cross-sea; at 2 p. m. the barometer read 28.05 (712.5), stationary; wind hauling gradually to the westward, force 4, with heavy dark leaden clouds coming rapidly up from the westward. At 4.30 p. m., wind w., force 11, and continued to blow with hurricane force for four hours; sky completely covered with dark heavy clouds; after 4 p. m. the barometer began to rise, and at 10 p. m. the sky cleared and the wind gradually decreased. The ship's position at 4.30 p. m. was N. 51° 25', W. 23° 02'. The s. s. "Bulgarian," in N. 51°, W. 22°, reported lowest barometer, 28.03 (711.9), at 4 p. m. of the 6th, wind varying from s. to w., with hurricane-like squalls and heavy rain. The s. s. "Abyssinia," in about N. 50°, W. 20°, reported: 6th, noon, hard s. gale with tremendous sea from the sw., barometer falling rapidly; at 6 p. m., the wind veered to w. and increased to hurricane force, barometer 28.27 (718.0); the vessel lay over on her side and would scarcely answer her helm, and blinding masses of spray completely covered her.

During the 6th, the storm-centre moved very slowly north-eastward, and on the 7th, it was apparently near N. 52°, W. 17°, the pressure at the centre remaining nearly the same as on the preceding day. On the 7th, the s. s. "Pereire," in N. 51° 02', W. 19° 49', reported barometer 28.92 (734.6), wind nnw., force 3. Captain Berry of the above steamer reports: From the 6th to 7th, encountered a very violent hurricane with terrific sea, lowest barometric reading (aneroid) 28.15 (715.0); the wind changed from e. to w., by south, and was most violent when at ssw., and increased to force 10. On the same day, the s. s. "Pennsylvania," in N. 51° 10', W. 16° 17', reported barometer 29.03 (737.3), wind sse., force 9, heavy sea, cloudy. Vessels to the west of the centre reported moderate nw. winds, while to the eastward, southerly gales of hurricane force were experienced. On the 8th, the disturbance having moved north-eastward, was central off the northwestern coast of Ireland, causing strong southerly gales along that coast and in the Hebrides.

IV.—This was a continuation of the depression charted as low-area iv., chart i. of this REVIEW. On the 7th, the disturbance was central over the Gulf of Saint Lawrence; it moved eastward over the southern part of Newfoundland, causing moderate gales in the southern quadrants. On the 8th, the depression was shown near N. 51°, W. 42°, the winds having increased to strong gales in the southwest quadrant. An extensive area of low barometric readings occupied the Atlantic north of the fiftieth parallel on the 8th; the pressure recovering but

slowly after the passage of the preceding depression, number iii., but the circulation of the winds, as reported by vessels west of the thirtieth meridian, indicated the existence of an independent storm-centre to the westward of that meridian. The s. s. "Scandinavian" reported: "8th, 3 a. m., Greenwich mean time, wind s. by e., force 7; barometer falling, wind shifting to westerly; 2.45 p. m., barometer 28.69 (728.7), gale increasing, with violent squalls; at 5.30 p. m., vessel shipped a heavy sea, damaging boats and washing a seaman overboard." The s. s. "Pavonia," in N. 49° 35', W. 31° 43', reported barometer 29.18 (741.2), and falling, wind ssw., and gradually hauling to westerly; at 3.05 p. m., Greenwich mean time, wind sw., force 9 to 10, barometer 28.67 (728.2); at 4 p. m., wind w., force 10, barometer rising; 6 p. m., heavy squalls, attended by snow and very heavy sea. On the 9th, the storm-centre, moving northeastward, was probably near N. 55°, W. 25°; the s. s. "State of Nebraska" reported hard sse. gale until 6 p. m. of the 8th, when it lulled and hauled to sw., with threatening weather and falling barometer; and on the 9th, in N. 54° 25', W. 24° 30', the barometer read 28.24 (717.3), wind wsw., force 10, very high confused sea and snow squalls. Captain Vogelgesang, of the s. s. "Silesia," furnishes the following observations relative to this depression:

Gale of February 8-9th.—Ship's position N. 50° 04', W. 29° 30', to N. 49° 41', W. 32° 22'.

Date.	Time.	Barometer.		Wind.	Force.	Weather.
		Inch.	Mill.			
February 8.....	<i>Greenwich.</i>					
	3.00 p. m.	29.21	741.7	ssw.	8	rainy.
	4.00 p. m.	29.06	738.1	s.	8-9	do.
	5.00 p. m.	28.89	735.1	s.	9	do.
	5.30 p. m.	28.79	731.3	s.	9	do.
	6.00 p. m.	28.81	731.5	s.	9-10	do.
	7.00 p. m.	28.72	729.5	w. by s.	9-10	squally.
	8.00 p. m.	28.74	730.0	w. by s.	10	do.
	9.00 p. m.	28.79	731.3	w. by s.	10	lightning.
	10.00 p. m.	28.79	731.3	w. by s.	10-11	do.
	11.00 p. m.	28.79	731.3	w. by s.	10-11	squally.
	midnight.	28.85	733.8	w. by s.	10-11	do.
	1.00 a. m.	28.90	734.0	w. by s.	10-11	do.
	2.00 a. m.	28.93	734.8	w. by s.	10	do.
	3.00 a. m.	28.98	736.1	w. by s.	9-10	do.
	4.00 a. m.	28.98	736.1	w.	9	do.
	5.00 a. m.	28.98	736.1	w. by n.	9	do.
	6.00 a. m.	29.00	736.6	w. by n.	9	do.
	7.00 a. m.	29.02	737.1	w. by n.	9	do.
	8.00 a. m.	29.08	738.6	wnw.	9	do.
	9.00 a. m.	29.08	738.6	wnw.	8	do.
	10.00 a. m.	29.14	740.1	wnw.	8	do.
	11.00 a. m.	29.16	740.7	wnw.	7	do.
	noon.	29.18	741.2	w.	7-8	do.
	1.00 p. m.	29.20	741.7	w.	7	do.

On the 10th, the depression was apparently central near the Hebrides, causing a decrease of pressure over the British Isles and Scandinavia.

V.—This disturbance probably developed over the Gulf of Saint Lawrence, and, moving eastward, was central near the Banks of Newfoundland on the 10th. On the following day, the storm-centre was shown near N. 50°, W. 32°; the s. s. "Plantyn" reported as follows: 10th, noon (ship's time), latitude N. 50° 08', longitude W. 30° 46', strong west gale, with fierce squalls; barometer 28.91 (734.3); 10.30 p. m., calm and cloudy, rapidly falling barometer. 11th, 6 a. m., barometer 28.40 (721.3), wind sw.; at 6.20 a. m., wind suddenly shifted to nw., blowing with hurricane force; 7.30 a. m., barometer 28.60 (726.4); noon, 28.85 (732.8); ship's position at noon on the 11th, was N. 49° 40', W. 33° 24'; during the gale the vessel sustained damages to boats and decks. Captain Berry, of the s. s. "Péire," in about N. 49° 20', W. 32° 50', reported at 5 a. m., wind s., shifting to wsw., and freshening; at 9 a. m. the wind shifted to nw., blowing a hurricane, towards evening the wind moderated. The s. s. "Scandinavian," between N. 50° 37', W. 31° 49', and N. 51° 43', W. 27° 25', reported: 4.20 a. m., Greenwich time, gale moderating, barometer falling; from 5 a. m. to 7 p. m., wind from e. to nw., very variable in direction and force; at 8 p. m., blowing a hurricane from nw., barometer 28.20 (716.3). On the 12th, the storm-centre was near N. 54°, W. 22°, and heavy westerly gales were reported by all vessels between N. 47° and 52° and

W. 40° and 20°. On the 13th, the disturbance moved north-eastward, and was central west of the Hebrides, having caused strong southerly gales and rain over the British Isles.

VI.—This disturbance was probably a continuation of that traced as low-area v., of chart i., and during its progress eastward it appears to have developed great energy, the reports of marine disasters that occurred in mid-ocean indicating that this storm was one of the most dangerous of the month. The depression passed from the Canadian Maritime Provinces to the Atlantic early on the 12th, the lowest observed reading being 29.53 (750.0), at Halifax, Nova Scotia. By the morning of the 13th, the region of least pressure was transferred to about N. 49°, W. 35°, while a brisk increase of pressure set in over the region west of the forty-fifth meridian. Captain Scott, of the s. s. "Plantyn," reported: 13th, 4 a. m., (ship's time,) barometer 28.27 (718.0); 8 a. m., barometer 27.80 (706.1); 9.15 a. m., barometer 27.61 (701.3); 10 a. m., barometer 27.70 (703.6); 11 a. m., barometer 27.90 (708.6); noon, barometer 28.16 (715.3); during the twelve hours, the wind veered from ssw. to sw., w., wnw., nw., ne., nue., and n. The storm struck the ship at 9.45 a. m., and gave no sign of its approach. A little blue appeared in the northwest out of the hard gray sky, and the wind at once went to the ne. and backed again to the nne. and nw., with terrific squalls and high confused sea. Ship's position at noon, N. 48° 27', W. 36° 22'. The s. s. "Abyssinia," between N. 48° 14', W. 37° 00', and N. 46° 33', W. 41° 00', reported, 13th, 6 a. m., the barometer had fallen to 28.25 (717.5), wind wnw., blowing a whole gale, and a heavy bank of clouds was observed to rise in the northwest; at 6.10 a. m., the wind veered to nw., and shortly afterwards a terrific squall burst on the steamer with hurricane force; the roar of the wind resembled the sound of thunder, and the clouds appeared to touch the water, which was carried along in driving masses of foam. At 8 a. m., the barometer read 28.80 (731.5), and the wind slowly but gradually moderated to a strong gale. Captain Ringk, of the s. s. "Donau," reported: On the afternoon of February 12th, (about N. 48°, W. 32°), had strong w. by s. breeze, weather squally, with hail; at 10.30 p. m., lat. N. 47° 48', long. W. 33° 08', barometer 29.45 (748.0). During the night, the wind gradually hauled to the southward, and at 2.20 a. m. of the 13th, in N. 47° 10', W. 34° 15', it was se., moderate breeze, barometer reading 29.12 (739.6); at 6.20 a. m., (N. 47° 19', W. 35° 26'), wind s. by w., fresh gale, weather overcast, with rain, barometer 28.63 (727.2); at 10.20 a. m., (N. 47° 10', W. 36° 07'), barometer 28.28 (718.3), wind sw. by w., stormy, with rain, upper part of atmosphere apparently clear; at 11.40 a. m., (N. 47° 10', W. 36° 10'), barometer 28.17 (715.5); at 1.10 p. m., (N. 47° 10', W. 36° 13'), barometer 27.93 (709.4). For half an hour, (at 0.40 p. m.), fine clear weather, light clouds near the horizon; at 1 p. m., a thick bank coming up from the northwestward; at 1.10 p. m., wind suddenly shifted to w. by n., blowing with hurricane force. During the afternoon, the wind continued to blow with great violence from the nw., with very high confused sea, barometer rising rapidly; at 10.40 p. m., in N. 46° 50', W. 36° 18', the reading was 29.38 (746.2), weather stormy, with hail squalls. (N. B. The barometric readings are corrected.) Captain Healy, of the s. s. "England," in N. 49° 30', W. 33° 00', reported: encountered a hurricane, beginning at w. and veering to nnw.; at 6 a. m., Greenwich mean time, the barometer read 28.40 (721.3); at 10 a. m., 27.70 (703.6); at noon, 27.38 (695.4); at 2 p. m., 28.18 (715.8); at 4 p. m., 28.76 (730.5); at midnight, 29.00 (736.0). The gale was at its height from noon to 6 p. m., when it began to moderate, leaving a high confused sea; at midnight, it was blowing a heavy nw. gale, which continued until the 16th.

Captain Gleadell, of the s. s. "Celtic," reported, in N. 48° 51', W. 32° 12', morning of the 13th, wind sw., fresh gale with heavy squalls and rain, barometer (aneroid) at 4 a. m., (ship's time) 29.03 (737.3); 8 a. m., 28.32 (719.3); noon, 28.01 (714.4), wind hauling to w., and moderating down to a moderate gale; at 2 p. m., wind nw., heavy and increasing gale, with violent

squalls; 2.30 p. m., barometer 27.88 (708.1), which was its lowest reading during the storm. The gale was at hurricane force, with terrific squalls and heavy rain, sea running high and dangerous until 8 p. m., when it slightly moderated, barometer 28.98 (736.1) and rising rapidly. Captain Cochrane, of the s. s. "The Queen," reported: 2 a. m. of the 13th, wind fell light and backed by west to south and southeast, beginning to freshen to strong breeze with rain, barometer falling rapidly; at 2 p. m., wind shifted to sw., in a fresh gale and high sea, barometer still falling; at 6 p. m., the aneroid barometer read 27.60† (701.0) and the mercurial barometer 28.90† (734.0); the wind came from wnw., and blew a hurricane for four hours, (ship's position, N. 48° 28', W. 29° 04'), with heavy rain; it then settled down to a strong gale, with violent hail squalls, barometers all rising. The s. s. "Bohemia," in N. 46° 49', W. 31° 43', reported barometer (aneroid) 27.75 (704.8). Captain Morrison, of the s. s. "Ohio," reported: 13th, 4 a. m., in N. 49° 44', W. 28° 48', wind sse., moderate gale, light rain, barometer 29.19 (751.4); at 10 a. m., wind changed suddenly to wsw., squally and gusty, with rain, hail, and snow, barometer 28.47 (723.1); from 10 a. m. to 4 p. m., strong gusty winds, with hard squalls of rain and snow, wind generally from wsw. to wnw.; at 4 p. m., lowest barometer (corrected) 27.97 (710.4); at 4.30 p. m., wind shifted to nnw. and blew a hurricane for five hours, after which it settled down to a heavy gale with frequent squalls of snow, hail, and rain.

The reports show that this storm covered a very extensive area, all vessels between N. 45° and 50°, and W. 30° and 42°, encountered hurricane-like winds from west, northwest, and west-southwest, and vessels to the eastward of the thirtieth meridian, had heavy southerly gales. The report of the s. s. "St. Laurent," would indicate that the storm extended far southward and was equally severe. The report of the "St. Laurent," states that a violent hurricane was experienced on the night of February 13th, in the vicinity of the Azores (latitude and longitude not given); the captain was washed overboard; several seamen injured, and the vessel sustained much damage. On the 14th, the region of least pressure was transferred to about N. 54°, W. 23°; west of the thirtieth meridian, a general increase of pressure had set in, the winds becoming westerly and northwesterly, but showing no material decrease in force; to the eastward of W. 20°, the winds changed to southwesterly and increased in force. On the 15th, the depression passed northeastward, with increased pressure, at some distance from the Irish coast, causing strong ssw. gales and rain in Ireland.

VII.—After the passage of depression vi., the atmospheric pressure began to recover on the 14th, but this recovery was again checked by the development of a disturbance near N. 51°, W. 40°, on the 15th. The winds changed to ssw. and sw., near that region and rain or snow prevailed. On the 16th, the disturbance was central near N. 52°, W. 29°; the wind decreased somewhat in force in the western quadrants of the depression, and the weather became more settled. On the 17th, the disturbance apparently disappeared south of Iceland.

VIII.—This was probably a continuation of the disturbance charted as low-area vii., of chart i. On the 17th, it was central in Canada, whence it moved eastward over the ocean, and on the 18th, it was apparently central south of Newfoundland, attended by moderate gales. Moving northeastward, with increasing pressure, the disturbance on the 19th, was near N. 53°, W. 34°, attended by moderate northerly winds to the west of the centre, and moderate to strong ssw. to sw. gales, in the eastern quadrants. On the 20th, the winds decreased and the disturbance apparently dissipated, being followed by a great increase of pressure over the region east of the thirtieth meridian.

IX.—This is a continuation of low-area viii., of chart i. On the 21st, the disturbance passed over the Canadian Maritime Provinces, and on the 22d, was central southeast of Newfoundland, the pressure having decreased when the disturbance reached the ocean. Strong southerly gales occurred over the

region east of the centre, and continued, with diminishing force, during the 23d and 24th. On the 25th, the winds changed to northwesterly, and the centre of disturbance was shown near N. 51°, W. 33°, the pressure gradually increasing, and on the following day the depression disappeared. The easterly movement of this disturbance was slow, being checked by an area of high barometer, 30.50 (774.7), which was spreading from western Europe over the ocean.

X.—This is a continuation of the storm traced as low-area ix., of chart i. On the 25th, the disturbance passed over Canada toward the Atlantic, and, on the 26th, it was central to the southward of Nova Scotia, causing moderate southerly gales in the eastern quadrants. During the 27th and 28th, the storm moved northeastward, and on the last-mentioned date it was central near N. 47°, W. 40°, attended by moderate southerly gales, the pressures near the centre ranging from 29.60 (751.8) to 29.67 (753.6).

OCEAN ICE.

Chart ii. also shows the southern and eastern limits of icebergs in the north Atlantic during the month of February, and up to March 7, 1883. This chart is based on reports communicated by ship-masters to this office; reports furnished through the co-operation of the "New York Herald Weather Service," and other data published by the "New York Maritime Register."

Patches of floating ice and occasional icebergs have been observed as far south as the forty-second parallel, and to the westward of the fifty-second meridian, and isolated bergs have been reported as far eastward as W. 43°; but the reports show that the most dangerous region is that extending from about N. 43° 30', W. 50° 30', northeastward to N. 48° 00', W. 45° 00'. Within this region, large numbers of icebergs were reported, together with numerous large ice-fields, rendering navigation extremely dangerous. An examination of the chart will strongly suggest the advisability of a southern route as offering a greater degree of safety for vessels bound to and from Europe.

Icebergs and ice-fields have been reported as follows:—

January 30th.—S. S. "Switzerland," in N. 47° 35', W. 45° 04', sighted a large iceberg, distant about six miles, with several smaller pieces near it.

February 10th.—S. S. "George Shatuck," sixty miles from Saint Pierre, Newfoundland, encountered vast fields of ice until she reached Whitehead.

February 11th.—S. S. "Limosa," in N. 47°, W. 47°, encountered a large field of ice, apparently the southeastern point of a large floe, the northern limit of which could not be seen from the masthead. The vessel was compelled to alter her course.

14th.—S. S. "Lake Winnipeg," in N. 44° 30', W. 48° 30', passed several icebergs and some field-ice.

16th.—S. S. "Bulgarian," in N. 46° 00', W. 47° 00', sighted field-ice; also some icebergs, one of which was about eighty feet high; ice-fields continued up to N. 45° 00', W. 51° 00'.

18th.—S. S. "Amsterdam," in N. 45° 50', W. 47° 30', passed a large iceberg; in N. 45° 28', W. 49° 08', passed several large icebergs and sighted a large ice-field to the westward. Ship steamed a southerly course for sixty miles, then changed to westerly; after which no more ice was seen.

19th.—S. S. "The Queen," in N. 45° 49', W. 47° 23', came up to some field-ice and had to run to the southwestward for seven hours to clear it; several icebergs were also seen. The s. s. "Wyoming," in N. 45° 05', W. 48° 45', at 9 p. m., passed large quantities of field ice; also two small icebergs.

19th.—S. S. "Violet," forty miles east of Louisburg, Cape Breton island, encountered heavy drift-ice. The vessel drifted about the ice-field for eleven days, during which time a large hole, about six feet long, was knocked in her starboard bow. The vessel arrived at Halifax on March 4th, with forward compartment full of water.

20th.—S. S. "North Durham," in N. 45°, W. 47°, encountered a large field of ice which extended north and south as far

as the eye could reach; the ice-field extended from east to west one and one-half miles; also passed an iceberg. The s. s. "Rhynland," in N. 46° 19', W. 45° 44', passed a large iceberg, about two hundred feet high; in N. 46° 04', W. 46° 26', passed a group of nine icebergs, three of which were very large, one apparently leaving a reef extending northward about half a mile, over which the sea broke furiously; from N. 45° 55', W. 46° 42', to N. 45° 13', W. 48° 49', passed through large quantities of field-ice; new ice forming all over the Banks. In N. 45° 33', W. 43° 26', passed a large iceberg; in N. 45° 21', W. 43° 53', passed a large iceberg; in N. 45° 13', W. 48° 49', cleared the field-ice.

21st.—S. S. "Werra," in N. 44° 43', W. 48° 40', passed an iceberg about eighty feet long and twenty feet high; s. s. "Republic," in N. 43° 46', W. 49° 20', passed an iceberg; s. s. "Waldensian," in N. 43° 31', W. 50° 38', fell in with large patches of field-ice; ice was also seen in N. 44° 25', W. 48° 51'. The s. s. "Newfoundland," at Halifax, Nova Scotia, from Saint John's, Newfoundland, reported having passed a field of ice, extending from Saint John's to Whitehead, being visible as far as the eye could see.

22d.—S. S. "Helvetia," in N. 44° 05', W. 48° 53', passed through large quantities of field-ice, also sighted two icebergs; the s. s. "Alaska," in N. 44° 05', W. 48° 53', passed an iceberg and much drift-ice; the s. s. "State of Florida," between N. 48° 40', W. 48° 40', and N. 44° 00', W. 49° 10', passed large fields of ice and several icebergs, one of which was from eighty to one hundred feet high.

23d.—S. S. "Bavarian," in N. 45° 25', W. 47° 52', steamed through one hundred and twenty miles of field ice and sighted four large icebergs; the s. s. "Furnessia," in N. 45° 58', W. 46° 18', passed an iceberg about four miles to the northward; the s. s. "Hermann," from N. 45° 30', W. 47° 00', to N. 44° 20', W. 49° 00', passed large fields of ice and six large icebergs; the s. s. "Weser," in N. 43° 40', W. 48° 12', passed an ice-field, also, in N. 43° 34', W. 39° 03', passed two icebergs.

24th.—S. S. "Bothnia," in N. 44° 12', W. 48° 21', sighted two large icebergs to the northward, one about ten miles off; also in N. 44° 05', W. 48° 36', passed several small icebergs and patches of ice; the s. s. "Denmark," in N. 46° 02', W. 47° 08', at 7.30 a. m., sighted large quantities of field-ice and numerous large icebergs; field-ice much broken up; got clear of ice in N. 44° 38', W. 48° 17', having steered southward for sixteen hours to avoid it. The s. s. "Furnessia," in N. 44° 36', W. 48° 37', passed several small icebergs; the s. s. "Jason," in N. 48° 08', W. 48° 56', passed three large icebergs; the s. s. "Vandalia," in N. 44° 56', W. 48° 22', passed two icebergs, also in N. 44° 46', W. 48° 37', passed an ice-field.

25th.—S. S. "Jason," in N. 42° 01', W. 52° 46', passed an iceberg three hundred and fifty feet high; the s. s. "Pennland," in N. 45° 00', W. 47° 30', passed through a large quantity of field-ice; s. s. "Vandalia," in N. 43° 24', W. 50° 55', passed an iceberg.

26th.—S. S. "Bothal," in N. 46° 00', W. 47° 29', passed a large iceberg; the s. s. "Erl King," in N. 45° 00', W. 47° 30', at 7.30 a. m., passed a large iceberg; steered wsw. fifty miles and passed twenty-six icebergs; at noon, in N. 44° 40', W. 48° 35', encountered quantities of field ice closely packed, but easily broken; steamed through it for thirty miles, then found clear water.

27th.—Captain H. Schoonhoven, of the s. s. "Daniel Steinhmann," reported as follows: "27th, at 12.09 p. m., Greenwich mean time, in N. 45° 33', W. 47° 10', saw the first iceberg bearing nw. by compass, distant one mile, my true course being wsw.; about one hour later, saw an iceberg right ahead, and then several others on both sides, some being of immense size; kept ship away sw. (true) to clear them. At 4 p. m., still steering sw., steamed along a large ice-field, bearing about nw. by compass, distant two miles; it was from fifteen to twenty miles in extent, and there could be seen amongst it several large icebergs; later, passed several icebergs. The weather

had now become misty, and at 1 a. m. of the 28th, fell in with a large ice-field; kept away s. by w., (true), but at 1.30 a. m., was completely surrounded by ice; the sea being smooth, steamed slowly through it, keeping a ssw. course. At 3.30 a. m., got clear of ice, weather having cleared up. I again steered my wsw. course at full speed, being then in N. 44° 29', W. 49° 04', and saw no icebergs nor field-ice afterwards. We could distinguish the icebergs in the dark at a distance of one-quarter to one-half mile."

27th.—S. S. "Schiedam," in N. 44°, W. 47°, passed three icebergs and some small pieces; the s. s. "Spain," between N. 45° 03', W. 48° 26', and N. 44° 05', W. 49° 06', passed thirteen icebergs and large quantities of field-ice. The s. s. "Wieland," between N. 45°, W. 48° and N. 44°, W. 50°, saw twenty-five icebergs, and from 3.45 p. m. to 6 p. m., steamed a southerly course along the edge of an ice-field.

28th.—S. S. "British Crown," in N. 44°, W. 47°, passed three icebergs; s. s. "Lake Manitoba," in N. 45°, W. 48°, passed south of a vast ice-field and numerous icebergs, extending north and south as far as the eye could reach; the s. s. "Sorrento," in N. 45° 00', W. 48° 08', passed through thirty-seven miles of field-ice; the s. s. "State of Alabama," in N. 42° 30', W. 50° 00', passed a quantity of drift-ice; the s. s. "Newcastle City," in N. 45° 20', W. 48° 00', passed several icebergs and heavy drift-ice.

March 2d.—S. S. "Eastbourne," in N. 47°, W. 47°, passed several large icebergs.

3d.—S. S. "Greece," from N. 43° 29', W. 48° 01', to N. 42° 27', W. 49° 31', passed fourteen icebergs and a quantity of broken ice; the s. s. "Hohenstauffen," in N. 45° 43', W. 48° 00', passed several icebergs and some large ice-fields.

4th.—S. S. "Parthia," between N. 43° 50', W. 48° 33' and N. 43° 18', W. 49° 45', passed several icebergs; the s. s. "Wisconsin," in N. 43° 14', W. 49° 04', at 9.15 p. m., passed a large iceberg; the s. s. "Devon," N. 47° 44', W. 43° 44', reported: from the 4th to 6th, passed twelve large icebergs, and passed through about fifty miles of field ice; the s. s. "Newcastle City," forty miles south of Sambro, Nova Scotia, got into a field of ice and was detained in it for eight hours; the s. s. "State of Nebraska," in N. 43° 00', W. 49° 30', passed several icebergs and some field ice.

5th.—The s. s. "Australia," in N. 45° 00', W. 47° 10', passed several icebergs; the s. s. "Oder," between N. 47° 07', W. 46° 58', and N. 43° 18', W. 50° 04', passed immense fields of ice and many icebergs; the s. s. "Pieter de Coninck," in N. 42° 50', W. 49° 30', passed large iceberg.

7th.—S. S. "Peruvian," in N. 42° 33', W. 51° 00', passed a large iceberg.

The s. s. "Arctic," at Saint John's, Newfoundland, March 11th, from Dundee, February 27th, reported having passed through two hundred and fifty miles of field ice on the Atlantic. When three hundred miles east of Saint John's, seventy-eight enormous icebergs were seen from the steamer's bridge.

TEMPERATURE OF THE AIR.

[Expressed in degrees, Fahrenheit.]

The distribution of mean temperature over the United States and Canada, for the month of February, 1883, is exhibited on chart iii., by the dotted isothermal lines.

In the districts south of the Ohio river and east of the Mississippi, the mean temperature for the month has been above the normal, the departures being greatest in the south Atlantic and east Gulf states. In all other districts the temperature has been below the normal. In New England, and over the southern part of the country from the Rio Grande valley to Pacific coast, the departures from the normal have been slight, but they have been very marked in the northern plateau and northern and middle slopes.

In the first column of the following table is shown the mean temperature of February in previous years for the several districts, as determined from observations made at the Signal-Service stations; the second column shows the mean of Feb-